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Preliminary notes on the genus *Usnea*, as represented in
New England

R. HEBER HOWE, JR.

(WITH PLATES 21-23)

There is probably no small genus of Lichenes that seems more puzzling to the student than the genus *Usnea*, nor one over which lichenologists are more uncertain or have more often disagreed. We have only to follow the literature from Linnæus to Tuckerman to see how the status of the species has been continually rearranged, though the genus, so far as I can ascertain, has been monographed but once, in 1799.*

A long study of the plants of this genus in the field, with the assembling of a large collection of specimens, and a comparison of over two thousand examples in other herbaria, has led me to believe that the members of the genus are often determined by a most superficial examination, and that one of the best criteria of Tuckerman's *Genera Lichenum* (p. 13) — *papillate* or *epapillate* thallus — is left out of the equation in the majority of cases where it could have been applied. I have found numerous instances where examples with a *glabrous* thallus have been placed under *barbata*,† and distinctly *papillate* species labelled both *trichodea* and *longissima*. Superficial comparison is used so generally for the determination of lichens that one specimen, wrongly determined, may be the highway for many more.

The general infertility of the filamentous forms, the wide variety of color, which is greatly affected by age, both during growth and in herbaria, have also helped to lead to the common dilemma.

That in some ways the genus would be more easily understood if revised,‡ there seems little doubt, though the less we tamper with the only American standard to which we can cling, the bet-

* Schrader, H. A. Jour. für Bot. 1: 42-85, including *Alectoria*.

† See conclusion of paper.

‡ See Zahlbruckner in Engler & Prantl, Nat. Pflanzenfam.

ter — at least while field studies of distribution and of environmental effects are so sorely needed — a much better classification seeming now, with our present knowledge, improbable. Progress is not always indicated by frequent revision or by a multiplicity of names, a factor which I think to-day we are only too prone to forget.

It is true that so many different subspecies and forms of *Usnea barbata* have been described and are recognized that the concept of the typical form has been practically obliterated ; but is this necessary? *Barbata* no doubt now stands for a generic, rather than a specific concept in most students' minds. The diagnosis, as given by Tuckerman, is so brief and indefinite that specimens are rarely referred to it, but are placed under one of the forms, which have enlarged the limits of the species to include many untypical specimens.

This state of affairs is not easily remedied. The anterior pagination of *Lichen barbatus* over *L. floridus* in Linnaeus' original description* makes it impossible for us to adopt the perhaps more logical *Lichen floridus* for the type form on which to build,† unless we abandon *L. barbatus*. That intergradation also exists between all forms now classed under *Usnea barbata*, no one can doubt, and I am left, therefore, for the present as Tuckerman probably was, to accept the classification of his Synopsis of 1882, based mainly on Fries, as the only feasible one, and to let my field and laboratory studies elucidate wherever and whenever they can.

The only change that in late years has been made is to raise *florida*, *ceratina*, *dasyypoga*, and *plicata* to full species, which, it is true, rids us of the disallowed and absurd quadrinomials, and leaves our taxonomy of the present *barbata* group as follows ; *barbata* in this case, perhaps, should have been used to designate a papillate section :

Usnea florida (L.) Web.

Usnea ceratina Ach.

Usnea dasyypoga (Ach.) Fr.

Usnea plicata (L.) Web.

* Sp. Pl. 1155, 1156. 1753.

† It was recognized as such by Fries, Lich. Eur. 19. 1831. "Typus speciei est forma *florida*, optime fertilis & fruticulosa."

This raising was done by Herre in a most wholesale fashion; *hirta* and *rubiginea* being included, and though a follower of Zahlbruckner, he raises *plicata* to specific rank, which the latter in Engler & Prantl does not do. All this too, without a reason, except the admission that "the species [are] not always well defined and apparently intergrading." Such revisions only serve to burden, as a rule, the synonymy, and for the present, at least, I am unwilling to abandon Tuckerman, though I believe with further study a more lucid and correct classification can be adopted; and I believe that Herre's, based I suppose on that of Hoffmann, though now seeming somewhat warranted, will prove inadequate, and is not allowable according to the methods now followed in nomenclature.

I have used the life zones in outlining the range of the various species, though no doubt plants adhere less closely to such areas than do the animals, being dependent so largely on substrata and conditions of moisture. But to a surprising degree, a nice relationship is shown by this genus.

The following purely artificial key to the genus as represented in New England may be of some aid in determining the species of this difficult group:

Key

Thallus papillate

1. Terete.

- A. Erect; apothecia abundant, terminal.
 - Rigid; apothecia middling-sized.....*U. barbata florida*.
 - Subcrustose, strigose, short-branched; apothecia large...[*strigosa*].*
- B. Erect, rarely subpendulous; apothecia wanting (or very rare).
 - Rigid, generally hirsute, soresiate.....[*hirta*].
 - Rusty red.....[*rubiginea*].
- C. Subpendulous (maximum length, 30 cm.); apothecia rare or wanting, sessile on main filaments or subterminal.
 - Rigid, coarse; fibrils rectangularly arranged.....*U. barbata*.
- D. Pendulous (average length, 60 cm.); apothecia (rare or very uncommon as represented in this region).
 - Rigid, coarse; fibrils, if present, rectangularly arranged..*U. barbata ceratina*.
 - Pliant, slender (except at very base); fibrils rectangularly arranged.....*U. barbata dasypoga*.
 - Pliant, slender; lateral fibrils wanting.....*U. barbata plicata*.

Thallus epapillate

- E. Lax, slender (average length 30 cm.); fibrils capillaceous; apothecia not common.....*U. trichodea*.

* [] indicates contingent forms for which a name is a burden.

- F. Lax, slender, scurfy (maximum length 2 m.); fibrils
rectangularly arranged; apothecia wanting.....*U. longissima*.
2. Compressed.
Pitted, lax, slender (average length 60 cm.); fibrils capil-
laceous; apothecia rare.....*U. cavernosa*.
3. Angular.
Rigid, coarse (maximum length 1 m.); fibrils rectangularly
arranged; apothecia rare or wanting.....*U. angulata*.

Family: USNEEI

Genus: USNEA (Dill.) Ach.

USNEA BARBATA (L.) Fr.

This typical form must always include a great variety of individually * developed examples, though never includes *slender* filamentous plants of a pendular length exceeding 25 cm. In all save habit of growth and absence of apothecia (the latter a purely artificial line), it has every characteristic of the following subspecies *florida*; and from undoubted sterile examples of the latter, no line can be drawn. *U. barbata* is not uncommonly hirsute, and sordidate, when it is recognized as the variety *hirta*, along with seemingly sterile examples of the next. It is sometimes dichroic, when it is termed the variety *rubiginea*, though this condition is more common of so-called sterile *florida*.† Plate 21 accompanying this paper illustrates a unique phase which I have been able exactly to duplicate but twice,‡ and shows a curiously naked intermediate condition between *barbata* and *ceratina* (though much nearer the latter), which, if *barbata* is dispensed with, falls naturally under sterile *ceratina*, with fruited plants of which it was in one case growing.

The distribution of the typical form is coextensive with that of *florida*, which is suggestive, except that it is this generally infertile form that is largely restricted to the drier situations throughout New England, exclusive of the upper Canadian zone, where it is certainly only rarely represented. Typical examples are restricted to the Upper Austral zone, being apparently intermediary between *ceratina* of the middle Atlantic states and sterile *florida* of the Transition zone.

* Nylander, Syn. Meth. Lich. 267. 1858-60; "erectus aut pendulus," and "e pluribus constat formis."

† These plants in herbaria have always been difficult of determination, as pressing often makes what was an erect plant *in situ*, appear pendulous.

‡ From South Canterbury, Conn., Plymouth, N. H., and St. Martinsville, La.

USNEA BARBATA FLORIDA (L.) Fr.

This is a distinct and easily recognized subspecies, the tufted thallus rarely if ever attaining a development of over 12 cm. The apothecia reach a diameter of 25 mm.* Infertile conditions are not uncommon, and are abundant if we do not recognize *barbata*, and if we hold that *hirta* and *rubiginea* are merely contingent phases. In the so-called variety *hirta*, with the failure to develop apothecia, due presumably to lack of sufficient moisture, the plant often becomes hirsute (and now blackening with age), and is more or less sprinkled with soredia, the distal portions of the filaments often becoming confluent crusts, or sorediate. But this sorediate condition is not absolutely confined to *florida*, but is present occasionally in all forms,† and the difficulty of recognizing it by a name is at once apparent. No doubt if some of our foliose lichens were not so constant morphologically, the sorediate subspecies now recognized would appear as absurd as in the present instance. The stress of the original separation of this form, it has been said, was laid, as the name would imply, on the hirsute ‡ character, the sorediate condition being of secondary importance.

Rubiginea, plainly, it appears to me, is a case of dichromatism, and in other branches of science, ornithology, for example, dichroic conditions are not invariably named, *i. e.*, *Megascops* [*Otus*] *asio* (L.). Later it will be seen that filamentous forms are occasionally also dichroic, though the fertile *florida* is rarely affected.§ By way of explanation, the dichromatism seems perhaps to be due to some sort of dye that attacks mainly the infertile forms — possibly following up the cortex, and sometimes staining the cottony portions of the medulla outside the indurated cord. This explanation is suggested by the fact that the proximal portions are generally first colored, though this is not always true. The color on the other hand may be due to a morphological change as a result of age,

* Mexican specimen.

† Schaerer, 1839, says of *ceratina* "glabra vel verrucoso-pulverulenta."

‡ See first supposed reference, before Linnaeus' description: Tragus, H., "Muscus arborum villosus incanus," etc.; Schaerer, 1839, defines "verrucoso-pulverulenta, fibrillosa et efibrillosa"; Linnaeus' original description reads: "Lichen filamentosus ramosissimus erectus, tuberculis farinaceis sparsis." *Hirtus* would then seem probably used in the sense of rough.

§ Michaux, A., *Flora Boreali-Americana* 2: 332. 1819: "minus hirta, rubigineo-rubens; scutellis concoloribus." Sorediate specimens are frequently dichroic.

bringing about a new selective scattering, which seems the most likely solution, as old herbarium specimens become in time rust-red. This dichroic condition is at best very difficult of explanation. My friend Mr. Edward Mallinckrodt, of the Mallinckrodt Chemical Works, writes me in reply to a request of mine to investigate this coloration :

"The color is no doubt due to some change of an organic dye contained in the plant, not to any mineral substances and hence the difficulty in analyzing it, as we are easily able to handle mineral substances but not organic. You are no doubt aware that a good deal has been written upon the subject of red leaves without any consensus of opinion as to the cause, if I am properly informed. If I were sure that at the end of a month or so work on the lichen would lead to definite results, I might take it up although all of our men are pretty busy and outside problems are hardly in order, but as a matter of fact unless your lichen is an exception it contains a number of plant substances, which are pretty closely related and difficult to identify. Even if we got these out we would still be unable to put our finger on this one and say that its behavior in a test-tube accounts for the color change in the plant. The whole trouble is that with organic compounds nature works such extremely obscure changes that the chemist in the laboratory can hardly follow them. Analysis, therefore, is extremely difficult in this case, while comparatively easy in the case of mineral or inorganic products."*

Usnea barbata florida occurs on living deciduous trees, more rarely on conifers (degenerate on other substrata), throughout New England, save, in a broad sense, in the upper Canadian zone. It attains its greatest luxuriance in swamps, or in shaded and moist situations. In such places almost every plant found will be heavily fruited, whereas in drier localities only a few plants comparatively will bear apothecia, giving us proof that the remaining plants are sterile examples of *florida*, and should not be classed under a separate species, or even subspecies.

USNEA BARBATA FLORIDA (L.) Fr., f. *STRIGOSA* Ach.

This form, not recognized in Tuckerman's Synopsis of 1882, but included in the one of 1848, is a contingent form of *florida*,

* See Nylander, *loc. cit.* 265 : "Color rubiginosus interdum obviens vix nisi maceratione ortus, nec typicus (inde quoque in *Usnea florida* oritur var. *rubiginea* Mich., ut animadvertit Eschweiler).

and, so far as I can ascertain, has an approximately coextensive range; from obtainable data, however, it seems to be somewhat littoral, though I have examined specimens from the interior of North America. One from Fayette, Ohio, is dichroic. Some have supposed that *strigosa* represents an aged condition of *florida*, but I do not think that this can be proved. I have observed in the field fresh normal specimens of *florida* in three years grow old and blacken, becoming somewhat ligneous, brittle, and abraded, losing in this way their fibrils and assuming an estrigose appearance, but the short rami, the ample and therefore necessarily crowded apothecia are conditions that certainly in the second instance (short rami) cannot be brought about by age, and are characteristic of certain plants which can be referred only to Acharius' *strigosa*, a form of *florida* which may or may not be worthy of recognition — a form, I believe, that represents only an unusually luxuriant condition, brought about by abundant moisture, such as the littoral examples of the Atlantic seaboard, which are affected by fog, and particularly those seen from Mexico (Hidalgo, over 7,000 feet) and other regions of excessive moisture and luxuriant growth.

USNEA BARBATA CERATINA (Ach.) Schaer.

With the filamentous forms the difficulty of determination is increased threefold,* for immediately a greater similarity seems evident. If we remember, however, that so far we have considered only *papillate* forms, our work is greatly simplified. It is the present subspecies that I feel sure has caused the greatest perplexity in the determination of New England Usneas, for if we accept Schaerer's later diagnosis literally † (see *pl. 1*, Enum. Crit. Lich. 1850), I have seen but three examples of a truly filamentous *Usnea* from these states bearing large or even middling-sized apothecia. There are distributed in herbaria under this subspecies a great many specimens distinctly referable to *barbata* (sterile *florida*), and more often to the following subspecies *dasyypoga*. Throwing out the question of "apotheciis magnis," which of course

* The great luxuriance of Pacific coast specimens, due evidently to abundant moisture, if used for comparison, is very misleading.

† Enum. Crit. Lich. Eur. 3. 1850. See also Nylander, Syn. Meth. Lich. 269, "Thallus aut erectus aut pendulus."

only represents a state, the comparative, yet supposedly diagnostic terms, "lax," or "rather lax," are so indefinite as applied to the filamentous forms of this genus that they are really meaningless. In *Alectoria*,* the contrast is sufficient, and eliminates the personal equation.

It is interesting to note that in Tuckerman's Synopsis of 1848 (p. 8) he not only includes the contingent form *strigosa* which he later dropped, but does not include *ceratina* which he later included. It must be remembered that the former work referred to "New England and other Northern States," the region now under consideration, while the work of 1882 considered the lichens of all North America. If *ceratina* occurs in New England, then the statement of Tuckerman (1882), *i. e.*, "apothecia middling to large, rarer in extreme (mountain) forms, which pass into *c*" (= *dasyopoga*), must be made at least to read, "rarer in Transition zone where it passes into *c*" (= *dasyopoga*) above the Austral zone, and even then it seems we must leave the separation of *ceratina* from the following subspecies to practically the presence or absence of ample apothecia, which would again only emphasize the distinguishing of forms on fertile or sterile states. *Ceratina* no doubt is a rare subspecies in New England, as Tuckerman himself plainly indicates; and of the Tuckerman *Usnea* material that I have examined to date, not a single example has been found and in all the New England material I have examined, but a few examples can be placed here. Willey included it in his New Bedford list, but how typically or commonly represented we do not know, as no annotations are given. I have seen but three fruited specimens from New England, all collected by Miss Cummings at Plymouth, N. H., and all lacking lateral fibrils. Shaerer defined it as "fibrillosa vel e fibrillosa," but if we are logical in our taxonomy it would seem that we must either propose a name for this naked condition of *ceratina*, or drop *plicata* as a variety of *dasyopoga* (see Engler & Prantl), or recognize naked conditions of both coarse *ceratina* and slender *dasyopoga*, under one species *plicata*, which seems distinctly inadvisable.

* Between *A. chalybeiformis* and *A. implexa*.

USNEA BARBATA DASYPOGA Fr.

This subspecies is the pendulous (long on the Pacific coast), filamentous form that reaches 35 or 40 cm. in length. It is the occasional coarseness of the proximal portions of this lichen that has led it to be determined as *ceratina* by many individuals. *U. barbata dasy-poga* is common in the high altitudes of the Cana-

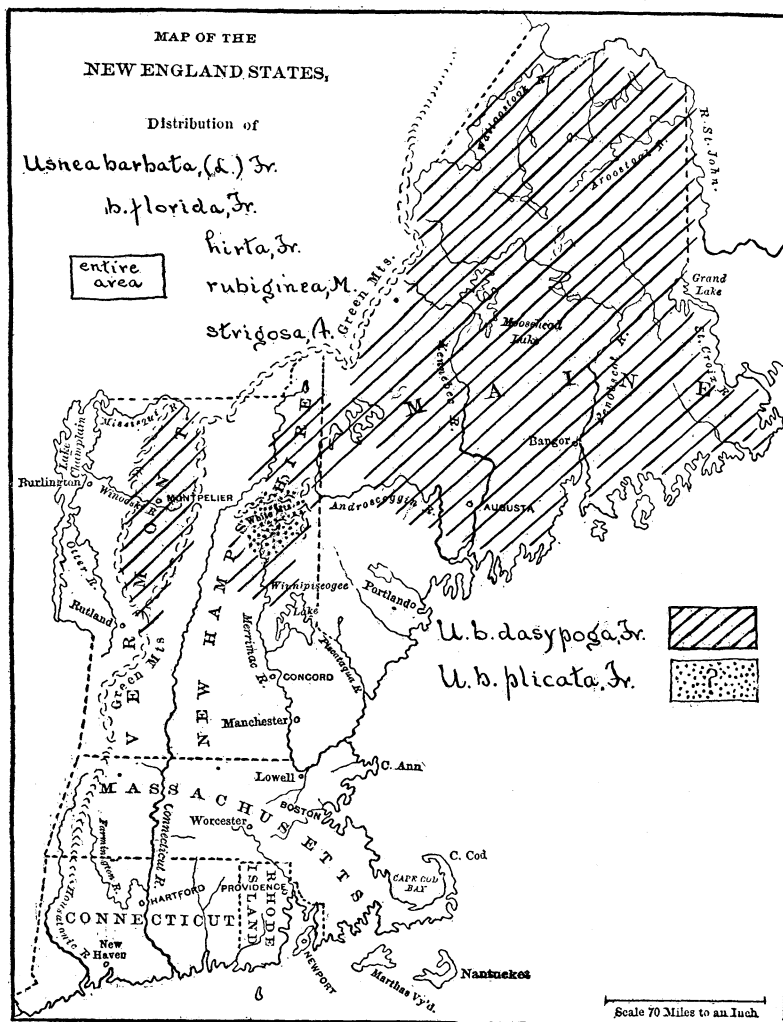


FIGURE A. Map showing distribution of subspecies and forms of *Usnea barbata* in New England.

dian zone, and occurs also in northern Maine, its range being quite similar to that of *U. longissima*. On what grounds Willey included it in his New Bedford list, we cannot tell, as the entry is again without annotation.* There are, however almost Hudsonian "islands" within his area where it could occur, with such species as *Certhia familiaris americana* (Bonap.) and *Parus* [*Penthestes*] *hudsonicus* Forst. Transitional forms between this and the typical *barbata* are common to the Transition regions.

USNEA BARBATA PLICATA Fr.

This subspecies is identical with the last, in regard to slenderness of filamentation, length of thallus, color and scarcity of apothecia. The difference lies in the *lack* of numerous rectangularly arranged fibrils. A specimen determined by Tuckerman † is unlike most of the specimens of recent collection and determination in the herbaria I have examined, and absolutely accords with the diagnosis. Under this subspecies I have found much material of expert determination which in reality is the epapillate *U. trichodea*. The range of *plicata* is held to be, so far as I can ascertain, coextensive with the last subspecies, though this form is evidently much less common and is more northern, being exhibited typically only from Alaska, northern Canada, and Siberia. I have not as yet seen an absolutely typical example from the New England states.

USNEA BARBATA ARTICULATA Ach.

This subspecies does not occur in this region, as Tuckerman implies, or else it is generally overlooked by collectors.

USNEA ANGULATA Ach.

This species in the majority of cases is well marked and easily distinguished. The angular, generally epapillate thallus sometimes attains a length of over one meter. Occasionally a specimen shows but little angulation, being nodulose instead, and approaches *barbata* or one of its subspecies (see specimen in Sull. Moss. Chapt.

* I have since examined the Willey herbarium and find neither subspecies represented by typical specimens.

† In the Taylor Herbarium, Bost. Soc. of Nat. Hist., from British North America; one fibril figured in our PLATE 22.

Herb., Mrs. L. A. Carter, Aug. 6, '01, Lake Winnepesaukee, N. H.*). This condition is mentioned by Tuckerman.

U. angulata seems to have a range somewhat coextensive with the following species, *U. trichodea*, though limited more closely to the Austral zone. In fact, it is only poorly developed, as I have observed it, in the Canadian coniferous "islands," where

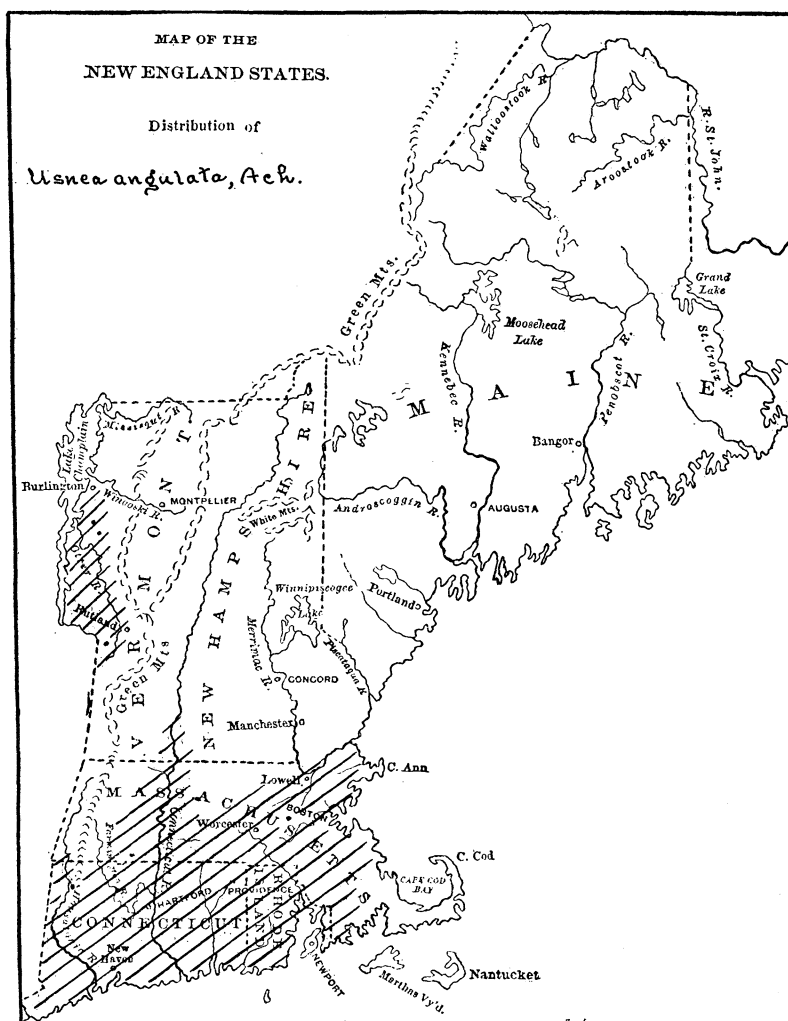


FIGURE B. Map showing distribution of *Usnea angulata* in New England.

* This even suggests *U. cavernosa* Tuck.

trichodea thrives. I have seen no specimens from Marthas Vineyard, but find it commonly, and well represented from Connecticut. Its presence in the Transition zone needs careful establishment. I have examined specimens from Bristol and Monkton, Vt., and one labelled White Mts.; Oakes Collection, in the herbarium of the U. S. National Museum.

USNEA TRICHODEA Ach.

We have now left to consider only the true, *epapillate* species, distinct and easily recognizable. The present, though variable in color, due to age, is *green*, and only in young plants does it appear yellowish. In maturity it is often an even darker shade of green than that of normal *florida*. *U. trichodea* is throughout, a distinctly slender and filamentous species, somewhat suggesting *cavernosa* (with which it is not often confounded) in character of fibrillation, though rarely attaining a pendular length of more than 25 cm. It often bears apothecia, especially near the coast (Cumberland and Hancock counties, Me., and Plymouth, Bristol, Barnstable, and Dukes counties, Mass.), and this helps to distinguish it from the commonly infertile *dasyypoga* and *plicata*, which problem the difference of geographical distribution makes largely unnecessary. Though, as has been said, with the latter it is continually confused.

Usnea trichodea is found commonly in the cold cedar swamps of the Austral zone, in fact it appears that its range is somewhat coextensive in the former zone with the Canadian "islands" of *Chamaecyparis thyoides* (L.) B.S.P., and in the latter with the cold swamp "islands" of *Larix*, *Picea*, and *Abies*. In these swamps *trichodea*, however, grows also on various accompanying trees — *Acer*, for example. The unique faunal region of Cape Cod and Marthas Vineyard, where Canadian and Austral faunas are bewilderingly associated, supports this species in abundance. The upper Transition zone or perhaps rarely lower Canadian zone seems to limit its range, except on the coast, where it extends northward certainly as far as Nova Scotia. I have found no specimens collected above 1400 feet. This species is undoubtedly the most common of the filamentous forms.

USNEA LONGISSIMA Ach.

In color this species suggests the last rather than *dasygoga* and *plicata*, though it fades to a yellowish in herbaria much more quickly than does *trichodea*. It is the most pendulous species and a length of nearly four meters has been attributed to it.* Though

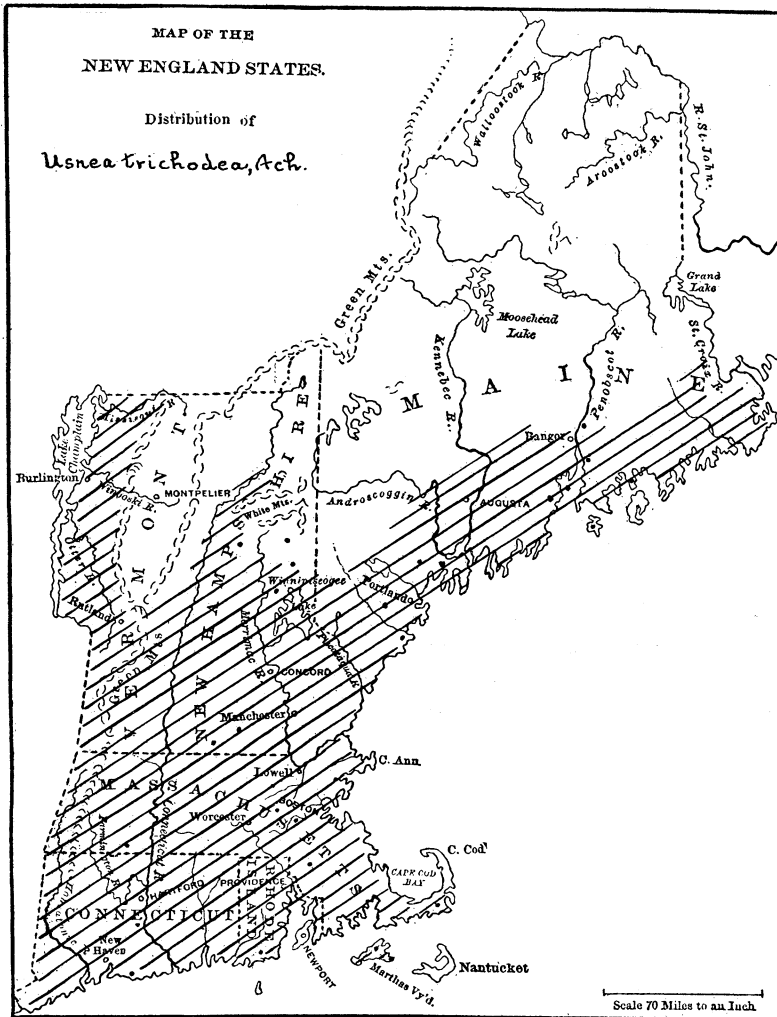


FIGURE C. Map showing the distribution of *Usnea trichodea* in New England.

* See Herre, A. W. C. T. Proc. Wash. Acad. Sci. 7: 345. 1906. This length is never attained, so far as I know, in New England, 3'm. being the maximum recorded.

never bambusaceous or papillate, it is nearly always *scurfy*, the main filaments of the thallus often appearing white, so thickly clothed are they in a furfuraceous crust. This feature is so characteristic and common that it may almost be used as a safe diagnostic character. The fibrillation suggests *angulata*, though the fibrils are of more varying length, of a more slender nature, and are more thickly beset.* Apothecia, so far as I know, have never been observed in New England specimens.

Usnea longissima is a species common to high altitudes, typical of the Canadian zone, which, it will be seen, allows its occurrence in Vermont, New Hampshire, and Maine (excluding the sea-coast in the latter south of Portland). I have examined no specimens collected below an altitude of 1200 feet, except from the Maine coast, where latitude equals altitude and where it is rare and poorly developed. Willey, a contemporary of Tuckerman, did not include it in his New Bedford list, but, of late, specimens from Transition regions have been erroneously determined as *longissima*.

USNEA CAVERNOSA Tuck.

I cannot find any reference to the occurrence of this species in New England other than Tuckerman's statement, "White Mountains," in his Synopsis of 1882 (p. 43). From this we can judge it is a rare member of the genus, perhaps the rarest, that occurs in these states, and that it is confined to the Canadian zone. I have examined but one specimen from this area, collected by Miss Cummings at Plymouth, N. H., March, 1891, and preserved in her herbarium at Wellesley College.† The pitted and compressed thallus of this species is perfectly diagnostic. The fibrillation suggests *trichodea*.

In closing this paper it seems decidedly preposterous for me to question the determinations made in this genus by Miss Clara E. Cummings, and yet I am certain after a most careful study of the genus that if Tuckerman's diagnostic criteria of *papillate* or *epapillate* thallus is valid (along with his other distinctions), and I have found it to be unerring, then no. 83, *Usnea longissima* Ach.,

* This is especially true of tropical and other regions of large rainfall, where it becomes *shaggy*.

† Another specimen (no. 1148 in author's herb.) has lately been received from Dr. Manton Copeland from Brunswick, Maine.

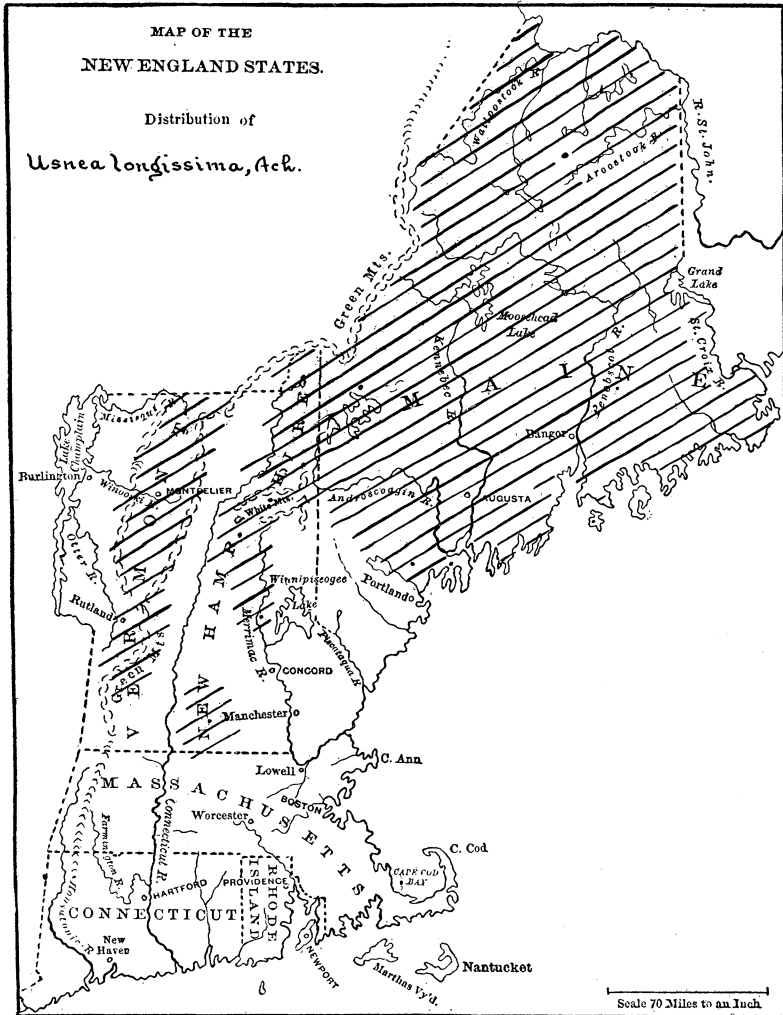


FIGURE D. Map showing distribution of *Usnea longissima* in New England.

in my set of Lichenes Boreali-Americani, second edition, collected at North Woodstock, N. H., August, 1892, by Miss Cummings, must be referred to *Usnea barbata dasypoga* Fr. The specimen distributed in my set is distinctly *papillate*, not scurfy in any portion, and not at all characteristically fibrilled. All other nos. 83 of this exsiccati that I have examined contain typical specimens of *longissima*, which would probably prove in this case that an error in

distributing had been made, which is little to be wondered at, considering the enormous pressure of work Miss Cummings struggled with in endeavoring to help others. One specimen, no. 52 of the "Decades," is also correct. With no. 269 of the former distribution, and no. 5 of "Decades" the case is, however, different. These specimens are labelled *Usnea barbata plicata* (L.) Fr.; they are, however, distinctly *epapillate* and untypically fibrilled. Moreover, the locality, Wellesley, Mass., is not within the range of *plicata*, so far as I have observed it or according to Tuckerman, whereas it is a region where *trichodea* is common. It is curious that no. 160 of the "Boreali-Americani" distribution is not only labelled *trichodea*, but contains excellent fruited specimens from Brewster, Mass. This mistake of Miss Cummings only goes to prove the undue stress laid on the presence or absence of apothecia and the difficulty of determining specimens from Tuckerman's meager descriptions in his Synopsis. *U. trichodea* bears apothecia frequently, true *plicata* never or very rarely, and is without lateral fibrils. These two statements are explanatory of Miss Cummings' error. The including of *longissima* from Waltham and *dasyypoga* from Natick, in the Flora of Middlesex County, Mass. (1888, p. 166), by Miss Cummings would certainly point to the fact that she believed both species to occur in the region of Wellesley. Feeling as I do, that Miss Cummings, or perhaps one of her aids, in this instance was mistaken, I am sure I have no right, at least, to let the matter go without mention, as I have said before "that one specimen wrongly determined may be the highway for many more," and this is especially true of specimens distributed in well-known exsiccati.

It is my hope to publish within a year or two a manual of North American Usneas, but before this can be done I have yet to examine a great many more specimens from outlying localities not represented in the herbaria I have so far seen, as well as to go over the literature with renewed care. The appended records are taken from all the published New England lists of which I have knowledge, and serve to show how sadly this side of the work has been neglected, and how much is left to be accomplished in the study of distribution. I have examined many of the specimens on which the annotations in these lists were made, as many erro-

neous records have crept in through a misunderstanding of the genus. Let me here enter a plea for more complete data appended to specimens, and a more common publication of authentic local lists, in order that a better study of lichen distribution can be worked out, which I feel sure would help in the labor of taxonomy and broaden our whole knowledge of lichens.

For kind assistance and permission to examine various herbaria I am indebted to Dr. G. M. Allen, Mr. J. A. Cushman, Mr. C. W. Johnson of the Boston Society of Natural History, Dr. N. L. Britton, Dr. M. A. Howe, Dr. J. H. Barnhart, and Mr. R. S. Williams of the New York Botanical Garden, Miss Mary F. Miller of Washington, D. C., Prof. Bruce Fink of Miami University, Dr. Lincoln W. Riddle of Wellesley College, Mr. Fred. LeRoy Sargent of Cambridge, Mr. W. D. Jackson, Bridgewater State Normal School, Mr. Mintin A. Chrysler of the University of Maine, Prof. W. Whitman Bailey and J. Franklin Collins of Brown University, Dr. Manton Copeland of Bowdoin College, Mr. A. H. Norton, of the Portland Society of Natural History, Prof. G. E. Stone of the Massachusetts Agricultural College, Mr. A. S. Goodale of Amherst College, Miss M. A. Day of the Gray Herbarium, Mr. J. S. Galbraith and Prof. S. F. Clarke of Williams College, Mr. Witmer Stone of the Academy of Natural Sciences, Philadelphia, Dr. Alexander W. Evans of the Sheffield Scientific School, New Haven, Conn., Mr. C. C. Plitt of Baltimore, Md., Dr. J. N. Rose of the U. S. National Museum, Washington, D. C., and many others.

Published New England records for the species of *Usnea*:

MAINE. — Harvey, 1894: *florida*, *hirta*, "*serotina*," *dasyypoga*, *plicata*: Orono, Harvey; Cumberland, Blake.

Harvey, 1894: *longissima*: Greenfield.

Eckfeldt, Wilson, & Cummings (in Rand & Redfield), 1894: *barbata*, *florida*, *hirta*, *rubiginea*, *ceratina*, *dasyypoga*, *plicata*, *trichodea*: Mt. Desert.

Harvey, 1896: *plicata*, *longissima*: Jackman.

Harvey & Knight, 1897: *plicata*, *longissima*: Jackman.

NEW HAMPSHIRE. — Howe, 1906: *ceratina* (?): Mt. Monadnock.

Howe, 1908: *florida*, *hirta*, *rubiginea*, *strigosa*, *dasyypoga* (?), *angulata*, *longissima*: Mt. Monadnock region.

VERMONT. — Frost, 1871: *barbata, florida, strigosa, rubiginea, hirta, dasypoga*: Brattleboro.

MASSACHUSETTS. — Hitchcock, 1833: *florida, plicata*.

Hitchcock, 1833: *strigosa*: Plainfield.

Tuckerman & Frost, 1875: *barbata, florida, hirta, rubiginea, ceratina, dasypoga*: Amherst.

Sprague, 1880: *florida, hirta, rubiginea, trichodea*.

Waltham Botanical Club, 1883: *barbata, florida, strigosa, hirta, longissima*: Waltham.

Cobb, 1887: *barbata, florida, hirta, rubiginea, ceratina, dasypoga, angulata, trichodea, longissima*: Amherst.

Cummings, 1888: *florida, hirta, dasypoga, angulata, trichodea longissima*: Middlesex Co.

Willey, 1892: *barbata, florida, hirta, rubiginea, ceratina, dasypoga, trichodea*: New Bedford.

Howe, 1906: *rubiginea, ceratina* (?), *strigosa*: Middlesex Co.

Howe, 1903: *hirta*: Mt. Watatic.

CONNECTICUT. — Hall, 1877: *barbata, florida, rubiginea, dasypoga, (angulata, Prof. Eaton)*: New Haven.

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CONCORD, MASSACHUSETTS.

Explanation of plates 21-23

PLATE 21

Usnea barbata ceratina collected at South Canterbury, Conn., by Mrs. S. B. Hadley. Very slightly reduced.

PLATE 22

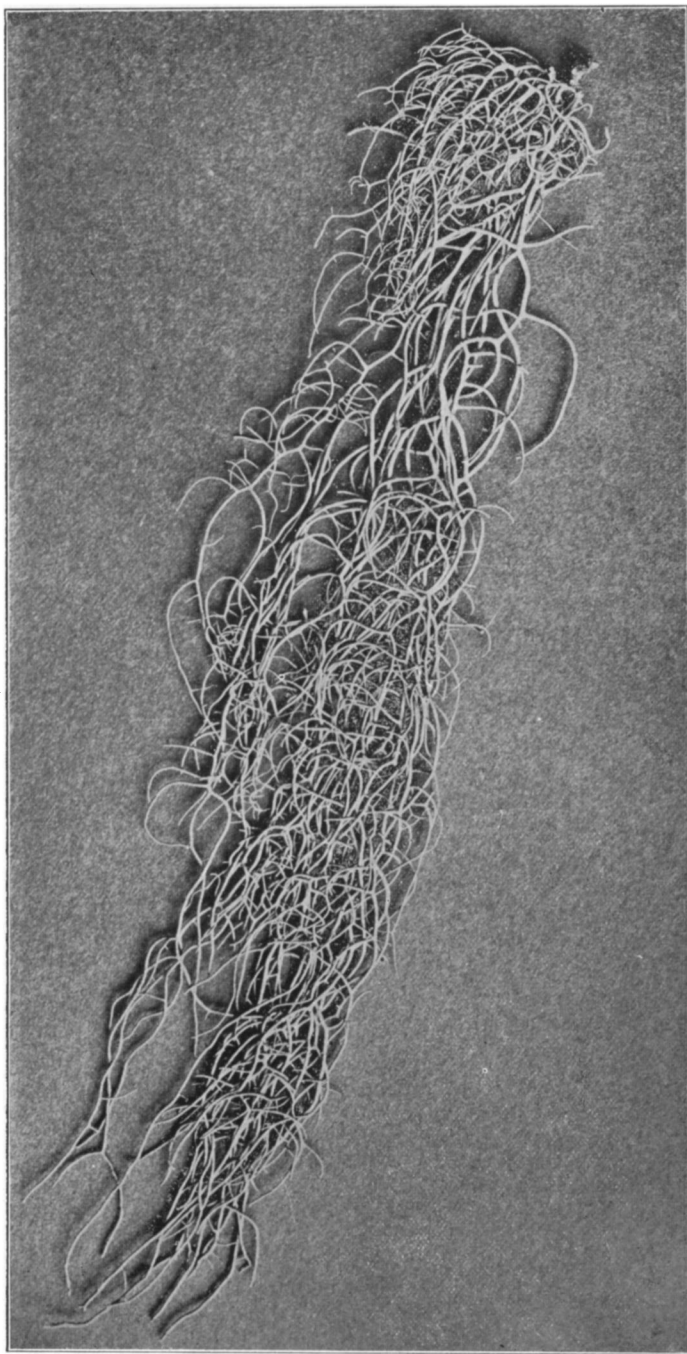
Papillate species

1. *Usnea barbata florida* Fr.
2. *Usnea barbata florida*, f. *strigosa* Ach. Notice short branching and large apothecia.
3. *Usnea barbata florida*, f. *hirta* Fr. Notice hirsute condition and sorediate terminal fibrils.
4. *Usnea barbata ceratina* Schaer. Notice coarse character and frequent presence of apothecia.
5. *Usnea barbata dasypoga* Fr. Notice similarity of fibrillization to that of *U. longissima* Ach. in lower specimen.
6. *Usnea barbata plicata* Fr. Notice almost entire lack of small fibrils (see text). All slightly reduced in size.

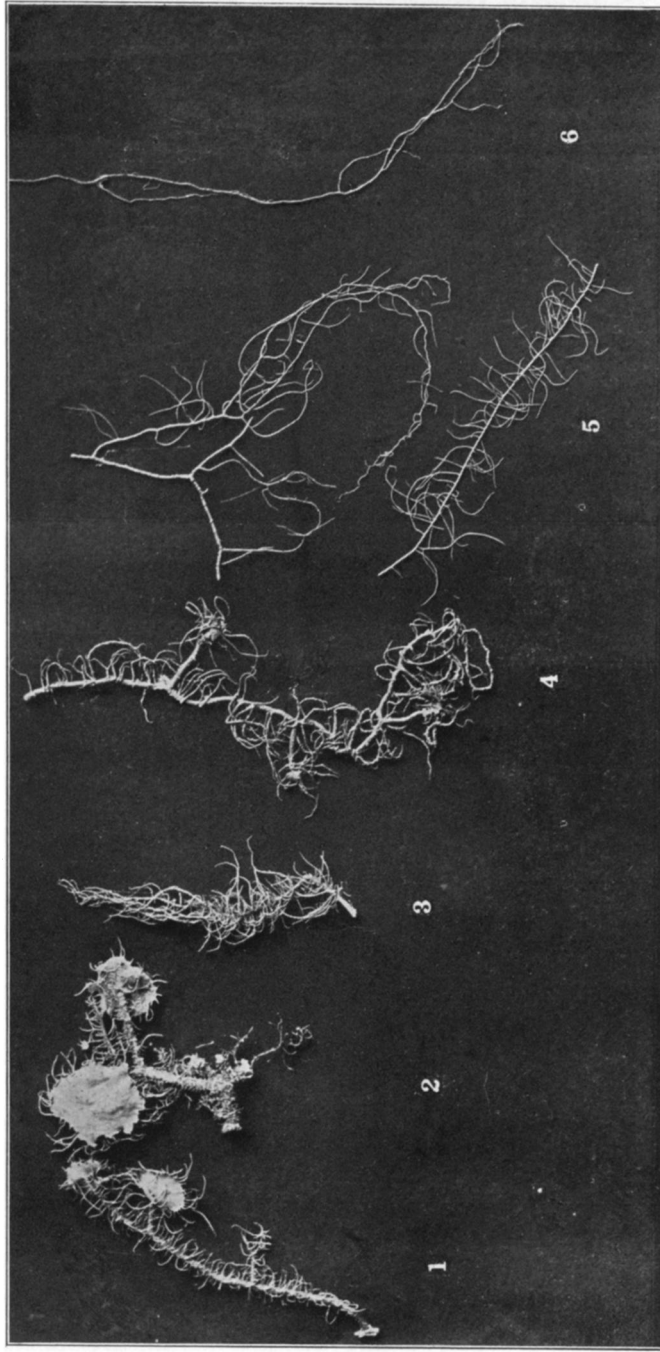
PLATE 23

Epapillate species

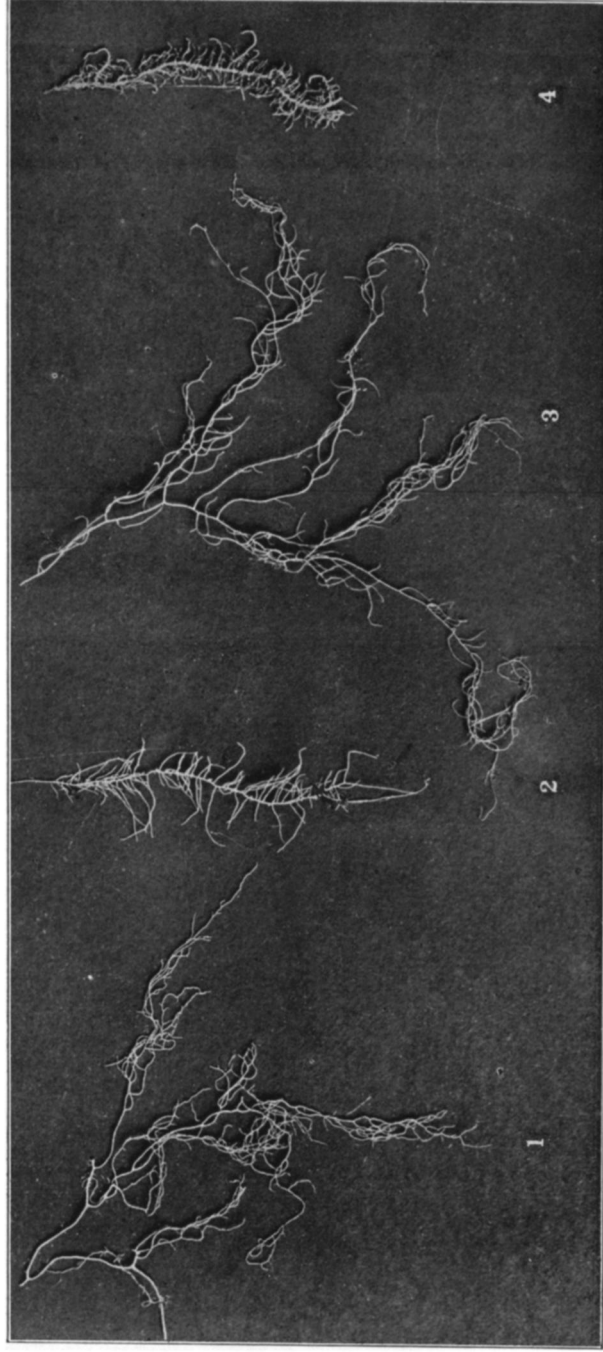
1. *Usnea cavernosa* Tuck. Notice similarity of fibrillization to that of *U. trichodea* Ach.
2. *Usnea longissima* Ach. Notice delicateness of main fibril as compared with *U. b. dasypoga* Fr.
3. *Usnea trichodea* Ach. Notice similarity in fibrillization to that of the upper specimen of *U. b. dasypoga* Fr.
4. *Usnea angulata* Ach. Notice similarity of fibrillization to that of *U. b. florida* Fr., intermediate between *U. longissima* Ach. and *U. b. dasypoga* Fr.



USNEA BARBATA CERATINA Schaer.



- | | |
|--|-----------------------------------|
| 1. USNEA BARBATA FLORIDA Fr. | 4. USNEA BARBATA CERATINA Schaer. |
| 2. USNEA BARBATA FLORIDA STRIGOSA Ach. | 5. USNEA BARBATA DASYPOGA Fr. |
| 3. USNEA BARBATA FLORIDA HIRTA Fr. | 6. USNEA BARBATA PLICATA Fr. |



1. USNEA CAVERNOSA Tuck.
2. USNEA LONGISSIMA Ach.

3. USNEA TRICHODEA Ach.
4. USNEA ANGULATA Ach.